

Tracking Movement of Cattle With Satellites

When you buy a new car, the salesperson will not only ask if you want a compact disc player and moon roof, but may also ask if you want OnStar or a similar product. These special features use Global Positioning Systems (GPS) technology to track your car anywhere in the world and can give you directions if you are lost.

Similar technology is being used to track cattle. Previously, the only way to see where cattle roam was to have people watch them, which is expensive. Researchers want to know why cattle travel where they do. A better understanding of grazing behavior will allow managers to disperse cattle more effectively. Livestock distribution is a major issue for ranchers, and GPS technology is the first tool to allow researchers to learn why cattle make the choices they do about where to graze.

Agricultural Research Service rangeland scientist Dave Ganskopp, at the Eastern Oregon Agricultural Research Center, Burns, Oregon, has attached collars with special radio receivers to a dozen cattle. These units receive information from a constellation of 24 to 30 satellites that may be working at any one time. Using the coordinates of these satellites, researchers can determine within a few meters where a cow was and at what time it was there. Not only do the GPS units track where the cattle roam, they also monitor head movements, thus indicating whether the cattle are eating, sleeping, or just walking.

Once he gets the information from the collars, Ganskopp puts the data in a computer and uses Geographic Information Systems (GIS) to understand and visualize the environment the cattle were in. With his results, Ganskopp will develop

An individual cow's travels in a pasture can be plotted at time intervals to produce contour maps looking something like this. Different-colored dots show travel during a period of time, for example, purple for one week's travels, light blue for another week's.

computer software to determine what the cattle will do in various situations. "Eventually, I hope to predict where they will roam and forage," he says.

Currently, cattle use only 30 to 50 percent of their pastures. Scientists know some of the reasons for this, but they want to learn more. They know cattle like to stay within a mile of water and prefer level land; that is, they tend to stay on land with a slope of less than 20 percent. Cattle also enjoy fresh grass with no dead stems in it, and they like land with few rocks.

"I am trying to find ways to get animals to disperse and use all the area for grazing," says Ganskopp. His study, in its second year, will also try to answer "what-if" questions generated by modifying the range with features such as fences, water, trails, or prescribed burns.

Other ARS scientists are using GPS in related research, such as those in New Mexico who "tell" cattle where to roam (see "The Cyber Cow Whisperer and His Virtual Fence," *Agricultural Research*, November 2000, p. 4) and instruct farmers on where to place fertilizer (see "GPS Helps Put Manure Where It Counts," *Agricultural Research*, June 1998, p. 16).—By **David Elstein**, ARS.

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DAVE GANSKOPP (K9942-1)

Cow equipped with a GPS collar, used to track the location of the animal.

